

## COMPARISON OF OVARIAN SURGICAL TECHNIQUES CONSIDERING OF ADHESION FORMATION.

Mehmet Tayyar\*, Melahat Sezgin\*\*, Rakip Turan\*\*

**Summary:** Fourteen rabbits were studied to investigate adhesion formation after closure and nonclosure ovarian surgery methods. In addition, heparin was used as a lavage to benefit its anti-adhesive effect. Five animals were used in each closure and nonclosure groups were studied. In control group 4 animals were studied, in which heparin lavage was used only. On the 30th postoperative day laparotomy was done, which showed that nonclosure method is less adhesiogenic than closure method ( $p<0.01$ ).

**Key words:** Ovarian surgery, nonclosure, closure, adhesion formation

### TAVŞANLARDA OVARYAN CERRAHİ TEKNİKLERİN KARŞILAŞTIRILMASI

**Özet:** Ovaryan "closure" (kapatarak) ve "nonclosure" (kapatmadan) cerrahi metodları adezyon oluşturmaları yönünden 14 tavşanda incelenmiştir. İlave olarak heparin anti-adezif etkisinden yararlanmak amacıyla lavaj yapılarak kullanılmıştır. "Closure" ve "nonclosure" gruplarında 5'er, kontrol grubunda ise 4 hayvan kullanıldı. Kontrol grubunda yalnız heparin ile lavaj yapıldı. Otuz gün sonra relaparotomi yapıldığında, "nonclosure" metodunun "closure" metodundan daha az adezyojenik olduğu görüldü ( $p< 0.01$ ).

**Anahtar Kelimeler:** Ovaryan cerrahi, "closure", "nonclosure", adezyon oluşumu

---

\*Assistant Professor of Obstetrics and Gynaecology

\*\* Resident of Obstetrics and Gynaecology

Gynecological surgical procedure can also cause postoperative adhesion as in any laparotomy. Examples to these surgical procedures are wedge resections, ovarian cystectomies, and resections of endometriosis. This surgical complication may result in infertility by obliterating the fallopian tubes by interfering the ovulation (1,2).

It is suggested that surgical trauma to the serosal surfaces induces to a fibrinogen rich exudate secretion. In many cases the fibrin fails to lyse and organizes in the form of adhesive bands. Therefore, since several years gynecologists have tried to find a least traumatic surgical technique that when the ovarian cortex is incised during any surgical procedure (3,4).

Leaving the ovarian cortex open or closure by the microsurgical techniques have been mentioned in the literature (1,2). The aim of our study is to compare ovarian microsurgical closure and nonclosure techniques in adhesion formation.

## **MATERIALS AND METHODS**

This study was induced at the Erciyes University, Surgical Medicine Sciences, Experimental Research Center. 14 female New Zealand white rabbits in reproductive age were used. They were weighed 2.5 to 3 kg and were divided into three groups: Closure (CL), nonclosure (NCL), and control (C) groups. Group CL and NCL each were consisted of 5 rabbits, that means 10 ovaries per group. Group C was consisted of 4 rabbits (8 ovaries).

All the animals were operated under ether inhalation anesthesia. The abdomen was shaved, prepared with povidoneiodine solution, and covered with sterile compresses. Operation was performed through the midline laparotomy under the operating microscope (P20, OPMI, N.2086, Warszawa, Poland).

In the groups CL and NCL, the ovaries were incised longitudinally approximately 3 mm in depth with scalpel (Figure 1). Than in group CL ovarian cortexes were closed with



**Figure 1.** The ovary incised longitudinally.

*Comparison of Ovarian Surgical Techniques Considering of Adhesion Formation: TAYYAR Mehmet ve ark.*

continous nonlocking 6.0 coated polyglactin absorbable surgical suture. Approximately five suture bites were used. In group NCL only sponge compressing was applied for hemostasis. In CL and NCL groups after hemostasis was realised each ovary irrigated by with 1000 U heparin. Electrocautery or additional sutures were not required to achieve hemostasis.

In group C laparotomy was realised in the same fashion and ovaries were and mobilized, and irrigated by heparin lavage. No incision and no suture was applied (Figure 2).



**Figure 2.** In group C the ovary was visualized and mobilized.

In all groups the abdomen was closed in two layers. The first layer was closed by continous 3.0 coated polyglactin absorbable surgical suture and the skin was closed with interrupted 4.0 polypropylene sutures.

On the 30th day all of the animals were

reoperated. They were killed with overdose ether, and then the adhesive bands were scored as was described before (1). In Table I adhesion score scale is presented.

Statistical analysis were performed using Student-t test.

### **RESULTS**

Adhesions scores were noted according to Wiskind AK, et al (Table I).

In Table I and II the statistical comparison of the adhesion scores are presented. The adhesion score of the CL group was  $0.94 \pm 0.05$ , and the NCL group was

$0.58 \pm 0.18$ . Statistical comparison showed significant difference between their scores ( $p < 0.01$ ). Adhesions were more dense in the CL group than the NCL group.

The adhesion score of the group C was  $0.18 \pm 0.05$ , and it showed statistical difference

**Table I.** Adhesion Score Scale (Wiskind AK,et al: Am J Obstet Gynecol 1990;163:1675)

Description of Ovary	Potential Score
Percentage of incision covered with adhesions	0-1.00
Percentage of lateral ovarian surface covered with adhesions	0-1.00
Percentage of medial ovarian surface covered by adhesions	0-1.00
Total adhesion score for each ovary	0-3.00

**Table II.** Statistical Comparison of The Adhesion Scores in Group CL and Group NCL

	Group CL (10 ovaries)	Group NCL (10 ovaries)	t	p
Adhesion Score	0.94±0.05	0.58±0.18	6.1	<0.01

**Table III.** Statistical Comparison of The Adhesion Scores in Group NCL and Group C

	Group NCL (10 ovaries)	Group C (8 ovaries)	t	p
Adhesion Score	0.58±0.18	0.18±0.05	6.7	<0.01

with the NCL group ( $p<0.01$ ). The adhesions were very slight in the C group than the NCL group.

In the CL group dense adhesions with the bowel were seen (Fig 3). However, in the

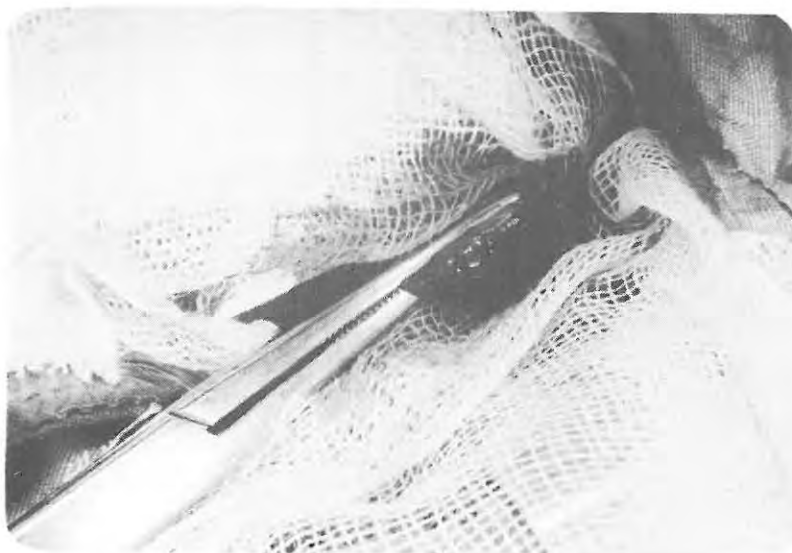
group NCL slight adhesions were noted (Fig 4).

#### **DISCUSSION**

Gynecological operations, particularly the



**Figure 3.** In group CL dense adhesion with the bowel is seen.



**Figure 4.** Ahealed ovary with slight adhesion in group NCL.

ovarian surgical procedures are accused for adhesive bands and infertility for many years. Many intraperitoneal gynecological surgical procedures previously had been performed through a laparotomy incision, now can be completed laparoscopically; and also LASER surgery is being used endoscopically. In endoscopic ovarian surgery ovarian cortex is left open for the reason that many reports claim to find least adhesiogenic method in the ovarian surgery (2,5,6,7).

Preservation of the ovarian blood supply, gentle, atraumatic tissue handling, using non-reactive sutures are important factors in the genesis of adhesions (1,8).

In our study, total adhesion score in group CL was higher than group NCL. This means microsurgical closure is more adhesiogenic than nonclosure method. In other words, incidence and severity of the adhesions after surgery were declined when the cortex is permitted to close by secondary intention. Wiskind and Bremsted reported similar results (1,2). Bremsted also used Nd:Yag Laser. They did not use heparin in their studies. We used heparin in combination to the surgical techniques. Through many years heparin is a well known anti-adhesive agent. Heparin reduces adhesion in human and animal studies. Heparin in combination with antitrombin III inhibits clotting by enhancing serine esterase activity thus reducing the deposition of fibrin strands that form the scaffold for fibroblast ingrowth. Heparin directly stimulates plasminogen activator activity which would enhance fibrinolysis, and heparin binds to fibroblast growth factor which stimulates wound healing (6,9).

In conclusion, our aim in this study was to compare CL and NCL ovarian surgical techniques in adhesion formation. NCL technique seems to be less adhesiogenic

than, ovarian CL technique. Reapproximation of the ovarian cortex is not required after ovarian surgical procedures and, in fact may be detrimental.

## References

1. Wiskind AK, Toledo AA, Dudley AG, Zusmanis K: Adhesion formation after ovarian wound repair in New Zealand white rabbits: A comparison of ovarian microsurgical closure ovarian nonclosure. **Am J Obstet** 163:1674-1678, 1990.
2. Bremsted JR, Deaton J, Lavigne E, Riddick DH: Postoperative adhesion formation after ovarian wedge resection with and without ovarian reconstruction in the rabbit. **Fertil Steril** 53:723-726, 1990.
3. Young RL, Cota J, Zund G, Mason BA, Wheeler JM: The use of an amniotic membrane graft to prevent postoperative adhesions. **Fertil Steril** 55:624-628, 1991.
4. Oeslner G, Grabe RA, Boyers SP, Pan SB, Barnes E, De Cherney AH: A comparison of three techniques for ovarian reconstruction. **Am J Obstet Gynecol** 154:569-572, 1986.
5. Bremsted JR, Shirk G: A second puncture probe for the laparoscopic delivery of the Nd: YAG laser. **Obstet Gynecol** 73:672-674, 1989.
6. Diamond MP, Linsky CB, Cunningham T, et al: Synergistic effects of Interceed and heparin in reducing adhesion formation in the rabbit uterine horn model. **Fertil Steril** 55:389-394, 1991.
7. Elkins TE, Stovall TG, Warrens J, Ling FW, Meyer NL: A histologic evaluation of peritoneal injury and repair implications for adhesion formation. **Obstet Gynecol**

*Comparison of Ovarian Surgical Techniques Considering of Adhesion Formation: TAYYAR Mehmet ve ark.*

70:225-228,1987.

8. Van Ryssel EJC, Brand R, Admiraal C, Smith I, Trimbos JB: Tissue reaction and surgical knots: the effect of suture size, knot configuration, and knot volume. **Obstet Gynecol** 74:64-68,1989.

9. Andrade-Gordon P, Strickland S: Interaction of heparin with plasminogen activators and plasminogen effects of the activation of plasminogen. **Biochemistry** 35:4033-4038,1986.